REMARKS

Claims 14-24 and 26 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Kawabe et al. (U.S. Patent No. 4,825,115) in view of Gilmore (U.S. Patent No. 6,043,590). Applicants respectfully request reconsideration of the rejections of claims 14-24 and 26.

Applicant previously noted that independent claim 14 recites electrical traces on flexible circuit material layers exposed on a first surface at a first pitch and the flexible circuit material layers extending from an opposite surface with a second pitch greater than the first pitch. Kawabe et al. and Gilmore do not disclose these limitations.

As previously noted by the Examiner, Kawabe et al. does not disclose the traces or the trace supporting material diverging from the Z-axis. Gilmore was relied on for this teaching.

Applicants noted that Gilmore provide backing for linear or curved arrays (Col. 1, lines 24-27). To support a curved array, the backing with traces is arcuate (Col. 3, lines 49-54; and Figs. 5a and 6a). On the arcuate (front) surface, the distal ends of the traces are flush with the distal end (arcuate surface) of the backing block (Col. 2, lines 64-67; and Figs. 5a and 6a). The flex circuit extends from the back or opposite surface (Col. 3, lines 56-58; and Figs 5a and 6a). The traces by the arcuate surface diverge, creating a greater pitch in the traces by the arcuate surface for mating with elements of the curved array (Figs. 5a and 6a). Gilmore provide greater pitch on the surface where the traces are exposed and lesser pitch on the surface from which the flex circuits extend. Gilmore does not suggest greater pitch for the surface from which the flex extends. Additionally, Gilmore suggests fanning the traces, not flex material having a greater pitch on one surface than the traces on another surface.

In response to the arguments above, the Examiner now alleges that Gilmore teaches changing the pitch at each end of a printed circuit element for easier connection. This is alleged to allow larger bonding pads and more workspace. The Examiner alleges it would have been obvious to fan out either the traces or the printed circuit boards since only a small portion of the printed circuit board extends beyond the absorbing material, and that it is reasonable to achieve fanning out within the confines of the backing block.

First, Gilmore clearly suggests a narrower pitch of traces for the bottom surface of the blocking block. Fig. 5a shows the traces with a narrower pitch for bonding than for adjacent to the elements. This arrangement shows Gilmore believes the pitch for circuit connection less than for element connection to be sufficient. Gilmore does not teach changing pitch at each end of the traces. There is no suggestion to provide a greater pitch on the opposite surface (i.e., the surface from which the flexible circuit material extends).

The Examiner alleges that the claim does not specify ends of the conductor. However, the claim provides for two surfaces – one where the conductors are exposed and an opposite surface where the flexible circuit material and the traces extend from the acoustic attenuating material. Gilmore shows exposed conductors adjacent the elements and flexible circuit material and traces extending from the opposite surface (Figs. 4 and 6a). Gilmore clearly shows greater pitch of the traces by the elements (the exposed surface) and a narrower pitch where the flex material extends from the attenuating material (the opposite surface). There is no suggestion to have a greater pitch in traces at the surface from which flex material extends. Given the teaching of greater pitch in traces by the elements (exposed trace surface) and room for bonding pads on the end with narrower pitch (opposite surface), there is no suggestion to have a greater pitch at the end where the flex material extends from the attenuating material.

Second, the Examiner takes official notice of routing traces to have a wider pitch for bonding, but Gilmore suggests a narrower pitch being sufficient, even for bonding. Sufficient space is provided for bonding pads with "a pitch less than the element pitch" (see Fig. 5a).

Third, there is no suggestion to change the pitch of the flex material, even if the trace pitch diverges contrary to the teaching of Gilmore. The flex material extends from the attenuating material and is flexible. A person of ordinary skill would have used the flexible nature of the flex material outside the attenuating material to route the flex material as needed to a circuit at any desired pitch. There is not motivation to provide the more difficult to manufacture greater or diverging pitch of flex material exiting from the attenuating material. Given the lack of suggestion to have greater trace pitch, there is no suggestion to have greater flex material pitch at the surface where flex material extends from attenuating material. Even with greater trace pitch, there is no suggestion for greater flex material pitch where the flex

material extends from the surface since the flexible material out of the backing block would flex to provide such greater pitch.

The Examiner notes only a small portion of the flex material extending out of the attenuating material. However, flexing only a small portion would greatly increase the spacing. The increased spacing would be provided outside the attenuating material. Additionally, if greater pitch was desired (which it clearly is not by Gilmore) for bonding and the flex material was short, a person of ordinary skill would have used longer flex material. Flex material is cheap and thin. In many transducers, the flex material is used to route signals a relatively large distance, so longer flex is known and would have been used. Arranging the flex material other than parallel for forming the attenuating material may be difficult. Flexing the flexible material outside the attenuating material would have been used by a person of ordinary skill in the art. There is no motivation, especially in light of other possibilities and motivations, to have a greater pitch of flex material at the surface of the attenuating material from which the flex material extends.

Kawabe et al. show the flex material extending from both ends of the backing. However, Gilmore teaches away from such a structure (Col. 1, lines 36-41 and 51-57 and Col. 1, line 65 – Col. 2, line 6). A person of ordinary skill in the art would not have used the teachings of Gilmore with the flex material extension by the array of Kawabe et al.

Gilmore cites to Kawabe et al. (col. 1, lines 36-41). Gilmore then highlights that the approach of Kawabe et al. in forming the conductors in the backing (attenuating) material increases risk of damage (col. 1, lines 51-57). More easy and inexpensive fabrication is desired by Gilmore than taught by Kawabe et al. (col. 1, lines 62-64). Claim 14 recites using separate pieces of attenuating material. However, Gilmore's improvement over Kawabe et al. is a monolithic backing (col. 1, lines 65 – Col. 2, line 6). Since Gilmore teaches away from using Kawabe et al. backing, a person of ordinary skill in the art would not have used the conductor and backing teaching of Kawabe et al. with Gilmore.

Independent claim 15 recites the electrical trace supporting material diverging from the z-axis. As discussed above for claim 14, Kawabe et al. do not show divergence and Gilmore

only teach divergence of the traces, not the trace supporting material. Gilmore in general seeks alignment with the elements of the array, so does not suggest divergence of the trace supporting material.

The dependent claims depend from claim 15, so are allowable for the same reasons. Further limitations distinguish from the cited art. For example, the cited references do not disclose M layers of trace supporting material and M+1 layers of attenuating material as claimed in claim 19. As another example, the cited references do not disclose divergence by different amounts as claimed in claim 24.

Independent claim 25 recites the attenuating material comprising trace supporting material diverging form the Z-axis. As discussed above, the cited references do not suggest supporting material, including the attenuating blocks, diverging from the Z-axis.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 694-5810 or Craig Summerfield at (312) 321-4726.

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